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NEW HAMPSHIRE COLLEGE

AGRICULTURAL EXPERIMENT STATION

ANALYSES OF THREE COMMON INSECTICIDES

BY FRED W. MORSE

Insecticides have become a necessity in farm economics, and the quantity used is steadily increasing. Worthless substances have from time to time been put on the market under various names, and complaints have been heard that the standard poisons have sometimes failed to kill the pests for whose destruction they were applied. In the summer of 1895, Professor Weed, entomologist of the Station, collected samples of five different brands of Paris green, one of London purple, and one of white hellebore, and handed them to the chemist for analysis.

Paris green, when carefully prepared, is a definite chemical compound, described in text-books under the names of copper aceto-arsenite and Schweinfurth's green, and contains fifty-eight and six-tenths per cent. of arsenic trioxide (white arsenic), to which its poisonous properties are mainly due. The ordinary article, however, varies in composition between rather wide limits. In Louisiana, a statute requires the substance to contain not less than fifty per cent. of arsenic trioxide.

In the bulletins of several of the agricultural experiment stations,* there have been reported fifty-four analyses of Paris

* Alabama, Bull. 58; Cornell, Bull. 18; Florida, Bull. 14; Louisiana, Bulls. 1 and 12; 2d series; Massachusetts, State Sta., Rep. 1894; Hatch Sta, Bull. 38; South Carolina, Rep. 1888; Texas, Rep. 1888; Vermont, Bull. 12.

green, forty-three of which showed more than fifty per cent. of the trioxide, and eleven less.

The proportions found in the samples analyzed at this station are given in the following table:

ANALYSES OF PARIS GREEN

Manufacturers.	Per cent. arsenic trioxide.
C. T. Reynolds & Co., New York,	56.36
Boston Color Co.,	55.90
Sondheim, Alsberg & Co., New York,	55.68
James A. Blanchard, New York, "Lion Brand,"	56.69
Nash, Winslow & Co., Boston,	55.35

These results show no adulteration, being nearly up to the theoretical composition.

ANALYSIS OF LONDON PURPLE

London purple is prepared from a waste product obtained in making aniline dyes, and consists mainly of calcium arsenite and a dye-stuff. The mixture cannot well be constant in its composition; but so far as learned, the proportion of arsenic trioxide varies no more widely than in Paris green.

Four analyses of the article have been reported from as many different agricultural experiment stations,* and the average amount of the trioxide was forty-three per cent., or about three fourths of the quantity contained in the more common insecticide.

The result of the examination of the single sample at this station is given below.

Manufacturer.	Per cent. arsenic trioxide.
Hemingway's London Purple Co., London, England., Leggett & Brother, New York, licensed packers,	37.56

WHITE HELLEBORE

White hellebore, the third insecticide examined, is a substance of a different nature from the others previously described. It contains no arsenic, being a purely vegetable poison. It may be prepared from two species of false hellebore (*Vera-*

* Cornell, Bull. 18; Florida, Bull. 14; South Carolina, Rep. 1888; Vermont, Bull. 12.

trum); the white hellebore (*Veratrum album*), which grows in Europe, and the green hellebore (*Veratrum viride*), or Indian poke of our wet meadows.

Gray's "Manual" considers the two species as very nearly identical; but the "Treasury of Botany" states that the white is more powerful than the green. The insecticide consists of the pulverized root-stalks of the plants, and contains the poisonous alkaloid, veratria. The most probable way of adulterating hellebore would be by adding earthy matter, to increase the weight. Such adulteration is easily detected by determining the quantity of ash.

The sample of hellebore examined, bore the label: "Best quality pure powdered hellebore. Put up by West & Jenny, Boston."

The analysis showed 33.13 per cent. of ash, which contained an abundance of iron and aluminum oxides, and insoluble siliceous matter, indicating considerable adulteration with clay.

Two analyses of hellebore were found in the report of the Massachusetts State Station, for 1889. One of the analyses showed less than seven per cent. of ash, and the other over forty. The former was evidently a pure sample, while the latter was reported to contain the same clay constituents found in the sample at this station.

Recently, four additional samples of hellebore were procured and their ash contents determined. One sample purchased of a dealer in farming tools, was in a sealed package, labeled "Leggett's Hellebore," and was prepared by Leggett & Brother, of New York. It contained 16 per cent. of ash.

The three other samples were bought of druggists from stock kept in bulk. One of the samples yielded 12 per cent. of ash, another 10.6 per cent., and the remaining one 34 per cent.

Three of these four samples may be considered as pure, although containing a high percentage of ash for vegetable matter. Unless the roots were thoroughly washed before pulverizing, there would undoubtedly be considerable earthy matter in the powdered article. But the last sample must either be adulterated, or very inferior in quality.

In conclusion, it must be said that no adulteration was found

at this station, in the insecticide most abundantly used. Should any reader of this bulletin, living in this state, have any Paris green on hand, which has failed to act in a poisonous manner, this experiment station will gladly examine a sample, if sent with postal or express charges prepaid.

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